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ABSTRACT

The Hartford Public Schools (Connecticut) received a Comprehensive Partnerships for Minority Student Achievement (CPMSA) grant from the National Science Foundation. In the first year of the grant, four schools (two elementary, one middle, and one high school) were identified for CPMSA activities. The CPMSA goal was to develop systemic approaches that would substantially increase the number of underrepresented minority students enrolling in precollege "gatekeeper" courses in science, engineering, and mathematics. Activities conducted through CPMSA in its initial year were organizational activities for program implementation, a summer enrichment program for students and staff, the distribution of a kit-based science program, and the adoption of new textbooks for elementary and secondary mathematics. The first CPMSA year was evaluated through interviews with administrators, teachers, and partners in business, industry, and other educational institutions. The program's first year had mixed results. The district's Board of Trustees and Superintendent have supported CPMSA efforts and have made strong commitments to standards-based learning curriculum frameworks and assessments consistent with CPMSA objectives. However, the first year of the program clearly suffered because there was no one in a leadership position with the full-time responsibility of managing CPMSA operations and budget. From the standpoint of the key partners, the Connecticut Academy for Education, the State Department of Education, the Loctite Corporation, the United Technologies Corporation, and the National Science Foundation, this shortcoming was significant. The future of the CPMSA in Hartford depends on the success of day-to-day tactical operations. This report recommends renewal of the grant, with a renewed commitment to management and implementation. (SLD)

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CPMSA

Comprehensive Partnerships for Minority Student Achievement

Hartford Public Schools

Annual Report

November 1, 1997

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CPMSA

Comprehensive Partnerships for Minority Student Achievement

HARTFORD PUBLIC SCHOOLS
Annual Report

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1. Introduction

A. Demographic Information

Number of students in the school district. Current grand total student enrollment in the Hartford Public School System is 23,414 (Connecticut State Department of Education data for 1996-97).

Number of students in the school district living below the poverty level. The number of students in the Hartford Public Schools who live below the poverty level (as determined by percent of students receiving free and reduced-price meals) is 17,350, or 74.1% of the grand total student enrollment (Strategic School Profiles, 1996-97). By contrast, 24.4% of the school age students statewide live below the poverty level.

Number of students directly involved in CPMSA activities. During the first year of the Hartford Comprehensive Partnerships for Minority Student Achievement (CPMSA) grant, there were four schools which the school district identified for CPMSA activities. The names of these schools, their grade levels, and current student enrollments are: M.D. Fox Elementary School, grades K-6 (961, down from 974 in mid-year), Mary Hooker Elementary School, grades PK-5 (350, down from 431 in mid-year), South Middle School, grades 6-8 (742, up from 647 in mid-year), and Bulkeley High School, grades 9-12 (1,500, up from 1,485 in mid-year) (source: building principals' office records).

Number and type of school district activities sponsored by the NSF's CPMSA program. Hartford Public School's central office personnel established three committees for the CPMSA program.

There was a Governing Board composed of Hartford Public School's central office personnel, including the principal investigator, co-principal investigator, and math, science, and technology chairpersons; representatives from the Connecticut State Department of Education, including the Commissioner of Education, Deputy Commissioner of Education, and state math and science consultants; representatives from business and industry; and representatives from the Connecticut Academy for Education in Mathematics, Science, and Technology (Connecticut's SSI, Project CONNSTRUCT). The Governing Board would provide oversight for the CPMSA grant.

Also, there was an Advisory Committee, made up of Hartford Public School's central office personnel, chiefly the chairpersons of math, science, and technology, and the four building principals. The Advisory Committee discussed implications of the CPMSA grant on both within school building and between school building levels.

There was also an Academic Council, which consisted of K-12 classroom teachers, who had expressed an interest in leadership roles for the CPMSA's teacher training program. The purpose of the Academic Council was to transfer information to staff and serve as a teacher training model.

Data indicates that the Governing Board met twice during the planning year, with some members reporting that they had not received notices of the meeting schedule or agenda. The Advisory Committee usually met twice each month from December 1996 through April 1997. The building principals were asked to attend Advisory Council meetings with their staff. One principal did so. The Academic Council also met approximately twice each month from December 1996 through April 1997.

Three other activities sponsored by the Hartford CPMSA grant in its planning year were: a summer program for students and staff, called "Summer Enrichment 1997;" distribution of a kit-based science program; and adoption of new textbooks for teaching elementary and secondary level mathematics.

Summer Enrichment 1997 included a morning program during which teachers offered science-rich activities to children from 6th grade (entering) through 9th grade (finishing). In the afternoon, the teachers participated in professional development activities related to the morning curriculum for the children, including emphasis on instructional use of graphing calculator and computer based labs. Also, there was provision for children's transportation, meals, and recreation.

The kit-based science program stemmed from a visit by Hartford Public School central office personnel and school teachers to a conference sponsored by the American Physical Society, during which workshops were held to demonstrate the use of self-contained kits for teaching elementary science. During the 1996-97 academic year, a number of science kits were purchased and subsequently distributed to the district's elementary schools, with emphasis on the target schools.

The Hartford Public School's district math chairperson selected and implemented the Saxon math program for district wide elementary level mathematics instruction. Also, the former district secondary math chairperson

adopted and implemented the Integrated Mathematics, Series 1, 2, 3, for use in all three of Hartford's public high

On October 3, 1996, in preparation for implementing the CPMSA grant, the Hartford Public School System provided mathematics and science workshops to its K-12 staff, district wide, on a variety of topics, including integrated math, Internet and telecommunications, kit-based science, lab safety, standards-based assessment strategies, graphing calculator, and using manipulatives to teach geometry and fractions. Presenters included colleagues who served as teacher trainers and consultants from local universities and science-rich institutions. A total of 159 teachers from Hartford's public elementary, middle, and high school levels participated in the one-day workshops.

B. Goals and Objectives

Goal of the Hartford CPMSA program. To develop systemic approaches that will substantially increase the number of underrepresented minority students enrolling in pre-college "gatekeeper" science, engineering, and math (SEM) courses.

Objectives of the Hartford CPMSA program.

1. To establish a balanced emphasis on all phases of the K-12 academic pipeline with major emphases on math and science enrichment.
2. To examine existing school district policies for the purpose of adopting new policies to facilitate the goal of the CPMSA program and improve the delivery of educational programs throughout the district.
3. To examine existing budgeting practices for the purpose of leveraging funding streams to facilitate significant improvement in delivery of the district's educational programs, using NSF funding as the catalyst for systemic change.
4. To develop an effective management, communication, and evaluation plan to implement systemic change for the purpose of achieving CPMSA goals and objectives.
5. To plan and develop standards-based teacher professional development and student enrichment interventions in specifically targeted elementary, middle, and high schools in respect to "gatekeeper" courses, and to implement strategies with assistance from NSF that are designed to increase enrollments and successful completion of these courses.
6. To limit participant support in the CPMSA program for both students and teachers to members of the Hartford Public Schools.
7. To maintain a database, starting in 1996-97, of all Level I participants which shall be capable of tracking them throughout their pre-college education. This baseline data shall be used for developing quantitative numerical goals of 10% by the end of the 1997-98 school year on specific outcomes pertaining to students' course enrollment, enrichment activities, and achievement. (Source: Cooperative Agreement, # HRD-9625121)

C. Relation of Goals and Objectives to Student Outcomes

Tabulated Indicators for Systemic Changes (TISC). (See tables.)

Background information. Documentation from various sources, including the Cooperative Agreement with NSF, indicates that the Hartford Public School System received official notice that the CPMSA grant would begin in October 1996. However, central office officials reported that the school district did not receive funds from NSF to support the program until December 1996. Most activities associated with the first year of the Hartford CPMSA transpired between December 1996 and October 1997, which Hartford publ school officials described as "getting off to a late start" and, concerning evaluation of the first-year accomplishments, they are "not quite a year into the program."

There were other local issues that influenced the direction and pace of implementing the Hartford CPMSA program. Two matters of great importance were the district's need to hire another new superintendent of schools (There would be five different superintendents in five years.) and the public dissatisfaction with the Hartford Board of Education. In March 1997, the new Superintendent of Schools, Dr. Patricia Daniel, received her appointment from the Board of Education. Shortly after Dr. Daniel took responsibility for running the Hartford public schools, the State of Connecticut dissolved the Hartford Board of Education and, in its place, established a State Board of Trustees, whose members Governor John Roland and the State Legislature appointed.

One of the most serious crises that Dr. Daniel inherited from the interim superintendent was the city's

flagship high school, Hartford Public High School, was facing loss of accreditation from the New England Association of Schools and Colleges. To resolve this problem, Dr. Daniel installed a new administrative team in that high school. Her options for building the new leadership team were difficult to execute, due to a number of substantive issues pertaining to the available pool of school district administrators, including seniority, competency, retirement, and transfer to suburban districts. She also made a number of changes in appointments of mid-level administrators within the school district's central office. In total, the Superintendent had to replace 50 positions last summer. To many outside observers of the Hartford Public School System, Dr. Patricia Daniel exhibited both courage and decisiveness in the first few months of her tenure as Superintendent of Schools. She established a new building administration and succeeded in buying time for Hartford Public High School to meet the terms for its accreditation. Many inside observers, including the teachers union, adopted a "wait and see" approach.

The Superintendent's restructuring of the Hartford Public Schools' included development of Curriculum and Support Teams. On September 19, 1997, Dr. Patricia Daniel in association with Dr. Anna Cimochowski, the Director of Curriculum, Instruction, Assessment, and Professional Development, adopted a model of interdisciplinary curriculum teams for each of the three Hartford Public School areas, which are identified by a particular high school and its feeder schools at elementary and middle school levels. The three areas are: Weaver High School, Area I; Bulkeley High School, Area II; and Hartford Public High School, Area III. The new quality control model provides students and staff with opportunity to accelerate and monitor curriculum implementation at the school site and classroom levels. Head teachers at elementary, middle, and high school levels received their appointments in September 1997 and will assume leading roles to implement standards-based curriculum and assessment. Through bimonthly meetings with district chairpersons, they will coordinate building and district level strategies to increase student achievement on the Connecticut Mastery Test (CMT) and Connecticut Academic Performance Test (CAPT). It is too early to assess the effectiveness of the model or appropriateness of administrator and teacher appointments to different leadership positions for the model and for the district as a whole.

Three of the recent changes of administrators held important consequences for the CPMSA grant. In fall 1996, Alfredo Fuentes, the secondary level mathematics chairperson for the school district and a member of the original CPMSA proposal design team, transferred to the Manchester Public Schools. Lenford Lawes, the 1996 replacement for Alfredo Fuentes, was assigned by Dr. Daniel to serve as vice-principal at Hartford Public High School. And, finally, Joseph Wall, the district science chairperson who spearheaded the application for the CPMSA grant, was also assigned by Dr. Daniel to work at Hartford Public High School as vice-principal. This transformation of the district's leadership is all the more striking when realizing that in the year previous to Hartford's application for the CPMSA grant, each of these administrators had been a classroom teacher. They had only recently moved into the position of school administrator at the central office level, worked one year or less as mathematics and science chairpersons, including responsibility for implementing the CPMSA grant, and then they held new positions. In the opinion of many observers both within and outside of the school district, these sudden changes and short term appointments contributed to substantive management and leadership issues, especially for the CPMSA program. Interview data from various sources shows that these leadership changes have been somewhat typical of the Hartford Public School System's central office administration.

In summer 1996, Pamela Barker-Jones was appointed chairperson of elementary mathematics for the district. Prior to this she had been a mathematics teacher at Fox Middle School in Hartford. Thus, she came on board for her first position as a district administrator in the same year when Alfredo Fuentes transferred to Manchester, when Lenford Lawes was appointed secondary mathematics chairperson, and when both Lenford Lawes and Joseph Wall, the district science chairperson, were assigned to be vice-principals at Hartford Public High School. She remains in central office, with responsibility now as chairperson of elementary math, science, and technology. In summer 1997, Mr. Jimmy Hill, former principal of Hartford's Fox Middle School, was appointed district chairperson of secondary mathematics. Currently, the Hartford Public Schools is searching for a district science chairperson.

Finally, an issue that most interviewees said was very important to the CPMSA program's successful implementation was hiring a full time program director to administer this NSF grant. From October 1996 through March 1997, the responsibility for management of the CPMSA program's operations and budget

shifted among the mid-level central office administrators, due to turnover. In March 1997, the Hartford Public Schools hired David Lawrence, former principal of South Middle School (recently retired), to serve part time as program director. Due to the heavy workload required for appropriate management of the CPMSA grant and a strong preference not to work full time, Mr. Lawrence resigned from his position in August 1997. The Hartford Public School System is now searching for a new CPMSA program director.

2. Systemic Change Drivers

A. Policy

Are district policies in alignment with CPMSA goals? Yes, the Hartford Public School System has established policy to ensure that a substantial number of underrepresented minority students enroll in pre-college science and math courses. On January 21, 1997, the Hartford Public School System adopted the following policy. To receive a high school diploma from the Hartford Public Schools, students enrolled in high school after July 1997 with a projected graduation date of 2001 or later must successfully complete three credits in mathematics and complete the following courses as part of the three credit requirement: Integrated Math One (equivalent of Algebra One) and Integrated Math Two (equivalent of Geometry). Middle school students enrolled in grade eight after July 1, 1997 will be eligible to receive one high school credit for mathematics if all of the following criteria are successfully met: student was enrolled in Integrated Math One by October 1 of the current school year; student was in attendance on a regular basis for the current school year; student's average in Integrated Math One at the end of the year is 70% or higher; student receives grade of 70% or higher on standardized final assessment for Integrated Math One.

Also, to receive a high school diploma from the Hartford Public Schools, the following requirement for science will apply: students enrolled in high school after July 1997 with a projected graduation date of June 2001 or later must successfully complete three credits in science, and all students must successfully complete one science course with a lab component.

Hartford Public School officials indicated that the above policy changes meet state requirements and include other aspects above and beyond the standard Algebra One concepts. In addition, the officials stated that the changes for science would not be fully implemented until 1998-99.

Finally, several years ago the Hartford Public School System adopted a School Improvement Plan, which called for systemic reform of curriculum, instruction, assessment, and the use of technology. The overall purpose of the School Improvement Plan is consistent with the mission of the CPMSA. Currently, the Superintendent is taking steps to enact some of the recommendations in this plan, including development and implementation of a K-12 standards-based curriculum in mathematics and science. The Strategic Plan also called for acquiring technology to facilitate classroom instruction and development of a technology infrastructure within buildings and across the district. Through recent state and private funding, the school district has introduced significant changes in its technology infrastructure and professional development of teachers for their use of technology to enhance and deliver instruction.

How do existing district policies impact the success rates of students in these courses? Without the recent policy changes, there would be a lower level of success for students. The new math and science policies establish a higher level of performance as the standard, which serves as an incentive for students to pursue higher achievement levels. In the past, the district's limited commitment to teachers' professional development in mathematics and science blunted the impact that elementary and middle school teachers could have on students' achievement. Recent changes in the state's curriculum and assessment, including adoption of standards-based curriculum frameworks in math and science that are aligned with the CMT and CAPT (expected this year), and the district's adoption of a Strategic Plan, provide clear guidelines for district-wide professional development.

What policies exist that serve to facilitate equal access by all students in these courses? As of July 1997, all students must successfully complete Algebra and Geometry, whereas previously taking these courses was an option. A district chairperson said, "We know that 50% of our kids are below average. Under the old policy, they might never get to Algebra and Geometry. At best, only 10% of the district's high school students have been enrolled in math and science 'gatekeeper' courses (as defined by CPMSA). The new policy change will drive the kids and teachers forward. The teachers can't leave anybody out now. They have to work with all of the students." The Hartford Public School System's high school curriculum is aligned with national standards from NCTM and NRC, state curriculum frameworks and assessments, and local Academic Area

Outcomes (PK-12).

Beyond these important content specific interests, the Hartford Public School System is taking systematic action to address the "Forty-Eight Recommendations," which it published in association with the State Department of Education, based on a recent assessment by Brown University. The overall concern of the Hartford Public Schools, with its new State-appointed Board of Trustees, and the Connecticut State Department of Education has been to use these guidelines, which relate to the CPMSA goals and objectives, to strengthen policies affecting equal access by all students to high quality education. There are recommendations in the "Forty-Eight Points," as they are called, for teacher professional development, standards-based curriculum reform, and students' summertime academic enrichment activities.

What district policies serve as incentives and rewards for teacher practices that support the goals and objectives of CPMSA? The restructuring of building and district level support services to establish Curriculum Support Teams provides teachers at all levels and in all buildings with colleagues who have been identified as head teachers or lead learners who have responsibility for implementing the standards-based curriculum and assessment. Consequently, subordinate teachers may see these positions as incentives or opportunities for career advancement. It is too early to assess the effectiveness of the new organizational structure.

Teacher leaders in the Hartford Public Schools who demonstrate a commitment to implementing standards-based teaching and learning receive recognition from the district's mathematics and science chairpersons and from the Director of Curriculum, Instruction, Assessment, and Professional Development. Additionally, the outstanding teachers receive rewards and recognition—including scholarships, stipends, and other incentives—from various outside organizations and industries, including the Connecticut Pre-Engineering Program (CPEP), United Technologies Corporation (UTC), Travelers Insurance, Loctite Corporation, the Connecticut Academy for Education, the Project to Increase Mastery of Mathematics and Science (PIMMS), and the Connecticut State Department of Education.

A cooperative venture by the Connecticut Academy (SSI) joined Dr. Timothy Craine of Central Connecticut State University, and Hartford's high school teachers to revise the 9-12 mathematics curriculum for the Hartford Public Schools. The distribution of this new curriculum occurred on August 28, 1997. Throughout this period of curriculum revision, Dr. Craine provided relevant professional development for middle and high school teaching staff, parents, guidance counselors, and district-wide administrators.

B. District Leadership, Governance, and Management

How does the district superintendent set the vision and chart the direction of CPMSA? How does that vision align with the district's overall goals and objectives? The Superintendent of schools, Dr. Patricia Daniel, serves at the pleasure of the State-appointed Board of Trustees for the Hartford Public Schools. In addition to exercising her professional discretion for planning and making decisions for the city's public educational program, she relies on the her central office staff, building administrators, teacher leaders, educational consultants and inservice agencies, and community partners. The goals and objectives of the Board and the Superintendent's goals for the 1997-98 school year have been set and are mutually complementary. Also, they are congruent with the goals and direction of CPMSA. In regard to content and design, the Hartford Public School System's 1997-98 goals represent a suitable model for district-level systemic education reform.

The newly revised goals for the Board of Trustees are: to revise and appropriately publicize all Board policies by the end of the 1997-98 school year; to clearly articulate the roles and responsibilities of the Board, Superintendent of schools, and the school administration by November 30, 1997; to adopt a policy requiring that all school personnel be provided with job descriptions and an annual evaluation; to develop a policy regarding parental involvement in the schools by September 30, 1997, with the expectation that parent - teacher communication by letter, phone call or conference will occur on a monthly basis; to adopt a policy to ensure that each school has a functioning school governance team, including representation of parents and community groups and defining the roles and responsibilities of the governance teams by November 30, 1997; to establish and maintain an effective working relationship with the Hartford City Council; and, in accordance with Special Act 97-4, the State-appointed Board of Trustees for the Hartford Public Schools will: oversee development of a long range facilities plan, based upon an updated enrollment projection, by June 30, 1998; oversee the development of a three-year technology plan, by December 1, 1997; oversee the development and implementation of a plan to deter opening week and habitual truancy, by September 1, 1997—a dropout prevention program will be developed by December 1, 1997, with goals set and monitored for each initiative;

oversee the timely completion of all renovations and distribution of supplies and materials as needed to ensure the smooth opening of schools in September; oversee the successful implementation of the city/school system joint financial management and personnel systems, as well as progress in regards to joint process improvement projects, as of June 30, 1998; oversee a comprehensive budget analysis to identify cost savings, by March 1, 1998 to permit a reallocation of funds to meet appropriate education needs; oversee the completion of an audit of the school system's financial operations by January 1, 1998, as required by state statute; oversee alignment of the school system to the goals of the 49 Points for School Improvement ("District Improvement Plan"), by December 31, 1997, including identification of curricular requirements, determination of educational outcome goals, and establishment of guides and training programs as appropriate; oversee the increase in the percentage of Hartford children enrolled in early childhood programs, from the current rate of 39.1% to 50%, by September 1, 1998; oversee full engagement of local colleges, universities, and corporations to assist the school system in the accomplishment of its mission, by March 31, 1998; determine that significant progress has been made on each of the 48 Points of the District Improvement Plan, by June 30, 1998; and oversee adoption of a program of continuous improvement in student performance on annual state mastery tests, including review of periodic reports to the Board on test results and progress of the continuous improvement plan.

The Superintendent's 1997-98 goals for curriculum and student outcomes are: to create effective teaching strategies and greater learning opportunities in early childhood programs to ensure that students in pre-kindergarten through 3rd grades master basic literacy and math skills at the level of grade three, beginning September 1997; to increase student achievement in all Hartford public schools, as measured by the CMT and the CAPT, beginning September 1997; to implement an effective truancy policy by September 2, 1997, and to develop a dropout prevention program by December 1, 1997; to determine appropriate staffing for schools according to the approved school improvement plans, by February 1998; to distribute essential instructional materials and custodial supplies to every school, beginning August 15, 1997; and to establish support teams to ensure that all three district high schools are in compliance with the standards of the New England Association of Schools and Colleges, beginning September 1997.

The Superintendent's 1997-98 goals for parent and community involvement are: to expand opportunities for the meaningful involvement of parents and all sectors of the community, particularly in regard to improved attendance, discipline, and academic performance, beginning September 2, 1997; to define the role and responsibility of school governance teams and establish a pilot program for decentralized functions by October 31, 1997; and to undertake a positive and effective information and public relations campaign about student, parent, and staff contributions and accomplishments, beginning August 1997.

The Superintendent's 1997-98 goals for school organization and management are: to develop and implement a comprehensive instructional and management technology plan, by December 31, 1997; to establish a process for adoption and updating technology and textbooks through completion of a curriculum audit, beginning October 15, 1997; to design and implement a three-year comprehensive professional development plan for all employees, beginning October 15, 1997; to establish procedures for the review and revision of all job descriptions, by November 15, 1997; to pilot the new personnel evaluation instrument for teachers, beginning September 1997; to complete annual performance evaluations for all employees, by June 30, 1998; to establish effective systems of accountability for personnel and finances as measured by SmartStream technology and the Superintendent's chart of organization, beginning September 2, 1997; to assist and support an operational audit, in accordance with Special Act 97-4 to be completed, by January 1, 1998; to promote a safe and inviting school climate through the establishment of a three-year capital improvement plan and a maintenance accountability plan for all facilities, by June 30, 1998; and to monitor and assess the effectiveness of the service delivery model for greater assistance to students and staff through the clustering of schools and curriculum support teams, beginning September 1997.

It is too early in the year to assess the accomplishments or effectiveness of this plan.

To what extent do all relevant district stakeholders understand and accept systemic change as a strategy for improving science and mathematics education? The list of district stakeholders is extensive, including the following: students, teachers, school administrators, parents, community leaders, other urban school districts in the state, social agencies, representatives from area business and industry, Project CONNSTRUCT and other systemic reform initiatives, science-rich institutions, the State Department of Education, the Governor and the State Legislature, and the citizens of the State of Connecticut. Because Hartford is the capitol city of

Connecticut, literally everyone watches what transpires there and hopes to see improvement in students' achievement and in the educational program as a whole.

Thus far, awareness of systemic change and the goals of the CPMSA grant is slight and underdeveloped among most of these constituencies. Yet, stakeholders can exercise substantial influence on the direction, pace, and ultimate effectiveness of this initiative. Their commitment to the goals and effective follow-through are essential to the initiative's success. Specifically, the teachers union is a major player in the implementation of Hartford's CPMSA program. Outsiders describe the Hartford teachers union as "a powerful force to be reckoned with." Clearly, the Board's and the Superintendent's goals for 1997-98 have important implications for teachers' practice, professional development, evaluation, and contract renewal. Currently, there is controversy within the national teachers unions on the manner and extent to which teachers and their unions will accept or contribute to systemic education reform. An important challenge for the Hartford Public School System, and for most school systems in the nation, is to develop a strategy that brings the teachers union to the same table where all of the stakeholders assemble as equals. The main concern must be: to improve all students' learning. A fundamental rule of this game must be: no one plays a trump card.

Data from interviews with various participants, including school and non-school personnel, and especially students and parents, indicates that most have little or no direct awareness of the CPMSA program or its goals. In many instances, teachers and building administrators required substantial prompts, explanations, and definitions before they could answer questions. For many questions these participants had no answers. The participants who knew about the goals and objectives of the CPMSA grant were: principal investigators, program director, proposal writer, district chairpersons, representatives from the SSI and related systemic initiatives, members of the Board of Governors, State Department of Education personnel, and a small number of teachers. However, some of these participants had little direct or up-to-date knowledge of the CPMSA's operations.

According to interview data, dissemination of information about the CPMSA program to all of the stakeholders is one of its greatest weaknesses. In explanation of this fact, participants said that the key personnel at the school district's central office have had too many other obligations. They also said that the district should have hired a full time CPMSA program director in October 1996, who reported directly to the Superintendent.

How are staff informed of the goals and objectives of CPMSA?

The main vehicles for transfer of information about the CPMSA grant were the Advisory Committee and the Academic Council. Interview data from building principals, lead teachers, and district math and science chairpersons indicates that it was through these regular meetings that they were informed about the CPMSA program. They received a copy of the proposal to read, participated in brainstorming sessions to explore different ways to implement the program, discussed the implications on building and district levels, and developed plans. As a follow-up, building principals reported to their staff on the Advisory Committee's results and lead teachers reported to their teams and departments on the Academic Council's work. In this manner, the key players disseminated information about the goals and objectives of the CPMSA program to other staff in the Hartford Public Schools.

In addition, math and science chairpersons discussed the CPMSA goals and objectives with inservice providers and staff during workshops and training sessions. Current school district policy has empowered lead learners or head teachers to initiate related standards-based curriculum reform on the building level and central office administrators indicate that progress is being made by the Curriculum Support Teams. The school district encourages teachers and provides them with support for professional development opportunities that are available from math, science, and technology inservice providers, such as PIMMS and Talcott Mountain Science Center (TMSC). Also, the Superintendent has publicized the district's goals for the 1997-98 school year.

However, building principals and staff reported that they have not received notice of a schedule for CPMSA committee meetings for the current year. Thus, since the 1997-98 school year started in September, they have received little or no information about the new CPMSA proposal or results of the CPMSA first-year planning grant.

How are teaching, counseling, and administrative staff empowered to help lead systemic reform? Every building must develop a broadly-based School Improvement Plan with an appropriate focus on the

improvement of mathematics and science teaching and learning. Each of the three areas of the Hartford Public School System has been assigned an Executive Director, who is a member of the Superintendent's executive cabinet and who has responsibility to monitor, provide assistance to, and report to the central office team on the progress made by the area's School Improvement Plans.

Also, as indicated earlier, each area has lead learners or head teachers for all of the academic and service areas. These individuals have a number of responsibilities, including the dissemination and collection of information from staff, communicating expectations of academic areas, and modeling effective teaching strategies.

How are teaching counseling, and administrative staff given an opportunity to develop activities that are in alignment with these goals? How do you measure the effectiveness of these activities?

The overall purpose of the area-wide interdisciplinary curriculum support teams is to disseminate knowledge and expertise in order to assist school site staff in their efforts to implement the standards-based curriculum. Since these teams were first established in September 1997, it is too early to assess their effectiveness.

However, in the first year of the CPMSA program, the most talked-about professional development activities were: implementation of the kit-based science program in the two elementary schools, adoption of the Saxon mathematics program for all of the district's the elementary schools, the Integrated Mathematics Series for the high schools, and the afternoon workshops for teachers at the 1997 summer enrichment program. Interview data from teachers and school administrators shows that the 1997 summer workshops for teachers were highly successful. Teachers reported that they learned how to use technology, such as graphing calculators and Computer Based Labs (CBL), and how to facilitate instruction in mathematics and science. Furthermore, the innovative, integrated science and mathematics curriculum designed by Dr. Allen Haught, physics teacher at Weaver High School, not only captured the attention and imagination of the students, but it also demonstrated to the Hartford School teachers how they can transcend the drudgery of ordinary science teaching, including going beyond the mass-marketed science kits.

The interview data showed that participants were less sure of the impact from the other curriculum development projects. Most elementary teachers welcomed the adoption of the Saxon mathematics program and see this material as appropriate in design and content for their students. It is too early to assess its impact on students' learning. However, the elementary mathematics chairperson reported that adoption of the Saxon mathematics program—given its alignment with NCTM standards, the state's mathematics frameworks, and the CMT—not only provides a good introduction to mathematics for pre-kindergarten and primary level school children, but also upgrades the elementary school teachers' knowledge of math and their competence with teaching math.

The implementation of the kit-based science program for the elementary schools and the Integrated Mathematics Series for the secondary schools had mixed results. The elementary teachers and building principals said that the kit-based science program was an excellent and long overdue way to teach science. They had been starved for appropriate methods and materials for teaching science for many years. However, they reported little or no inservice, inconsistent distribution, lack of follow-through, no refurbishing of the kits, and no plans for the second year of implementation. In explanation of this fact, the elementary school personnel said "the district chairperson has too many responsibilities and is spread too thin."

At the three high schools, mathematics teachers either welcomed the Integrated Mathematics Series (Weaver) or resented its adoption (Hartford Public and Bulkeley). The reason for this great discrepancy is that teachers maintained that the series was adopted without adequate participation by the secondary school mathematics teachers. Unfortunately for the mathematics chairperson, there was neither time nor opportunity for engaging the teachers in a full scale discussion of the textbook's merits. A directive was given by school officials for money to be spent immediately on materials and the purchase was made in time. However, inservice for teaching Integrated Mathematics is ongoing, with the workshops provided by one of the series's authors, Dr. Timothy Craine.

How are the activities coordinated, managed, and communicated?

The Hartford CPMSA has had a coarse and checkered history in regard to the coordination and management of its activities and the communication of its purpose and accomplishments. This result must be understood sympathetically and must be seen in the light of the recent history of administrative turnover, especially at the central office area, and the crisis of leadership at the former Hartford Board of Education.

Every partner who participated in the interviews with CRE—including officials at the Connecticut State Department of Education, Hartford Public Schools central office, the Connecticut Academy for Education (SSI), local business and industry, colleges and universities, and Hartford public school buildings—expressed an acute awareness of what they called "the leadership problem" (i.e., a lack of leadership) and attributed much of this problem to the multiple turnover of superintendents, malfunctioning of the former Hartford Board of Education, changes in mathematics and science chairpersons, and no full time CPMSA program director. Nonetheless, these same participants were quick to add that they had high expectations for an appropriate response to the CPMSA program and held the key players responsible for producing the results that are expected, namely, improvements in teaching and learning of mathematics and science. Restrained impatience and frustration is a good way to characterize the attitudes, especially of the key partners toward the CPMSA program.

How do other Federal funds and private grants support the district's overall plan for systemic reform? Two examples will suffice. The Connecticut Academy for Education (SSI) maintains a constant focus on Hartford's student performance in mathematics and science and explores ways to measure that. The Academy provides a technical assistance team to the district on a wide variety of services and team members are in the four targeted school buildings on a weekly basis. The Academy hired Aaron Rutherford to develop short- and long-term planning for mathematics, science, and technology education on after school, weekend, and summer enrichment programs for Hartford's students. Also, the Academy is working with the Superintendent in an effort to help define the most significant data points on student performance and to bring information that is useful for decision making back to the teachers and building principals. Richard Cole, Executive Director, and Gemma Joseph Lumpkin, Director of Urban Technical Assistance for the Academy, both serve on the CPMSA Governance Board.

Contributions to the CPMSA from the United Technologies Corporation (UTC) which are directed by its representative, Dr. Tierney Temple-Fairchild, are substantial and provide both direct and indirect support for the CPMSA program. Dr. Temple-Fairchild serves on the CPMSA Governance Board. During summer 1997, she assisted with implementing the summer enrichment technology training program for 60 teachers by providing the CPMSA program with 16 professional trainers from UTC and its suppliers. In fact, UTC exercised foresight with the summer training program because it was planned to be a pilot for learning centers that UTC opened up during fall 1997 at three other Hartford schools. Thus, the success of the summer program led to additional courses being offered to over 400 teachers at other learning centers in the school district this fall.

Also, UTC provided support for improving the technology infrastructure in Hartford's schools, ensuring that the schools would be connected to the Internet. Through Dr. Temple-Fairchild's efforts, UTC funded a comprehensive technology plan for the district, including the infrastructure development. In addition to the important technical aspects, this approach to improving the infrastructure included a balance of understanding the issues of technology use that are peculiar to the Hartford Public School System, namely understanding that there are 34 old school buildings that have to be connected to each other eventually. UTC's substantial investment in South Middle School provided the school with technology equipment, professional development, and created a plan for technology integration over a three year period of time.

There are also federal funds from Title I and Eisenhower Title II Math and Science programs. New funding for technology has come from the City of Hartford. The Connecticut State Department of Education provided grants, in particular its Priority Schools Program helped support the summer 1997 academic enrichment program for Hartford's students.

C. Standards-Based Curriculum

Which standards were adopted in the Hartford Public School System and why? According to key participants in the Hartford CPMSA, the Hartford Public School System adopted the National Council of Teachers of Mathematics' (NCTM) and the National Research Council's (NRC) standards for curriculum, instruction, assessment, and professional development for mathematics and science respectively. They said this choice is based on the belief that the national standards for teaching and learning mathematics and science are appropriate and that they are consistent with the standards, curriculum frameworks, assessment, and professional teacher training systems, in particular the Beginning Educator Support and Training (BEST) program developed and maintained by the Connecticut State Department of Education.

How do these standards relate to actual teaching practice? The elementary and middle school principals in the target schools reported that they and their assistants are required to conduct annual evaluations of their staff. In addition to the formal requirement to observe teachers providing classroom instruction, the building principals conducted informal visits to classes and participated in teachers' workshops and conferences. They said that in the past year they have observed changes in the teachers' practice of teaching mathematics and science, due to the implementation of the Saxon math series and the kit-based science program. Lead learners or head teachers reported the same results. There are some teachers in these buildings who for various reasons lag behind their peers, however, the principals reported that most are improving their knowledge of math and science and their competence with teaching these subjects. The elementary and middle school principals' chief concern is that there has not been sufficient consistency and continuity in the district's curriculum and professional development programs for math and science.

At the three high schools, the results are different. Adoption of the Integrated Mathematics Series is a disappointment to some secondary mathematics teachers because they felt they did not have the opportunity to review the materials before adoption. Thus, the quality and extent of its implementation across the district is uneven. Dr. Timothy Craine is providing inservice workshops to train teachers in the new, standards-based approach to teaching high school mathematics. At Weaver High School there is general acceptance of the new series. At Bulkeley and Hartford Public the principals and lead learners reported that a small number of their colleagues in the math departments have adopted the text. Others are disgruntled and may use it grudgingly.

The use of technology for teaching mathematics and science, particularly the graphing calculator and CBL, is increasing due to long-term, sustained inservice sessions from UTC, Connecticut Academy Fellows, and other inservice providers.

What model is used to disseminate standards-based curriculum throughout the Hartford Public School System? The district's office of Curriculum, Instruction, Assessment, and Professional Development is responsible for disseminating the standards-based curriculum throughout the Hartford School System. The model consists of the usual chain of command for administrative systems, including the Superintendent at the top and then central office personnel, followed by coordinated teams consisting of teachers with varying levels of responsibility, building principals, and central office personnel. The district chairpersons have primary responsibility for administering the Curriculum Support Teams—the new organizational structure for implementing the interdisciplinary curriculum. Lead learners or head teachers encourage and empower their colleagues to share and cooperatively develop teaching strategies that lead students to higher achievement levels and improved motivation to learn. Staff meetings for professional development occur after school with small groups of teachers sharing ideas in monthly department meeting times and during site-based grade level meeting times.

Also, the Director of Curriculum, Instruction, and Assessment meets with groups of teachers on a regular basis to obtain teachers' responses on the lessons learned about new materials and improved strategies for teaching mathematics and science at all grade levels. The Director has requested that the district mathematics and science chairpersons develop a monitoring instrument during the 1997-98 school year that will assess the teachers' academic knowledge of mathematics and science and the extent to which their methods of teaching are consistent with the NCTM and NRC standards. School administrators meet with the Superintendent on a monthly basis and report on professional development activities related to increasing students' achievement on the CMT and CAPT. During summer 1997, the district conducted its Hartford Public Schools' Administrators' Academy at which administrators learned about the CPMSA program and the newly adopted high school mathematics curriculum. The Director of Curriculum, Instruction, and Assessment reports that, since April 1997, there has been "extra heavy emphasis on the mathematics component."

How does the Hartford Public School System use mathematics and science standards to motivate students who have traditionally been educationally underserved to pursue college programs in mathematics and science? Currently, the district's the new policies in mathematics and science for graduation from high school serve as an inducement for Hartford's public school students K-12 to pursue higher levels of achievement and, thus, prepare themselves better for college programs in SEM. In addition, the district's efforts—with substantial assistance from UTC, the Loctite Corporation, the Connecticut Academy for Education, the

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Connecticut State Department of Education, CPEP and other inservice providers—to establish a district-wide technology infrastructure and to implement computerized hardware and software for K-12 instruction in mathematics and science offers Hartford's public school students state-of-the art instruments and methods for teaching. The stage is set with the Superintendent's goals for the 1997-98 school year. Sustained professional development of the classroom teachers coupled with modernization of the Hartford public school classroom should motivate the students to learn mathematics and science for their K-12 education, college, and beyond.

D. Standards-Based Instruction

How do instructional strategies reflect a district philosophy that all children can learn challenging curricula at high levels? School district officials and teachers reported that, until recently, the K-12 classroom practices showed a high level of sameness, in that teacher-directed activities and student passivity were commonplace. When delivering instruction in mathematics and science, teachers depended heavily on textbooks which were not written in accordance with the NCTM and NRC standards and bore little if any relationship to standardized, criterion-referenced tests. Teachers and building principals described the K-12 science curriculum, in particular, as a "hodge-podge" or "come hither, come yon" affair. In other words, the district's science curriculum lacked the meaningfulness and continuity that comes from an integrated scope and sequence of well thought out topics, materials, activities, and assessments all of which are linked to the ongoing professional development of the district's teachers. Additionally, lead teachers reported that the elementary teachers' knowledge of mathematics and science has always been at a lower level than what is required for instruction at those levels. Similarly, in the past, they infrequently employed hands-on activities and inquiry-oriented projects to teach math and science. Technology use was sporadic and ineffectual, also. At the secondary level, far too many students never enrolled in advanced math and science courses, because they were more or less content to finish minimal requirements for graduation by cycling through the introductory courses.

The district's adoption of the kit-based science program, Saxon Mathematics Series, and Integrated Mathematics Series has begun to change all that. Also, there is provision for top quality inservice workshops, such as UTC's team and the Academy Fellows, that are targeted to specific populations of teachers at the building site level. The Superintendent's goals for the 1997-98 school year challenge everyone in the district to deliver standards-based teaching, learning, assessment, and professional development. The stage is set in Hartford for a new era in public schooling. However, it is too early to assess the results of these CPMSA initiatives.

How are teachers empowered to develop, implement, and share these strategies? The same conditions apply to the teachers' practice of teaching that apply to their development of standards-based curriculum for mathematics and science. The Superintendent's Curriculum Support Teams model for 1997-98 encompasses methods, techniques, and activities of teaching as well as textbooks, other instructional materials, and supplies. In the past, teachers had very few supplies other than a textbook for teaching mathematics and, especially, science. The Superintendent's plan for 1997-98 should at least relieve this shortage. Elementary school teachers and building principals said that, during 1996-97, they experienced a dramatic and positive improvement in the materials for teaching science, thanks to the kit-based science program. If the service continues, especially with provision for consistent inservice training and refurbishing of the kits, these educators will be highly pleased.

What percentage of math and science teachers demonstrate knowledge of NCTM or NRC standards? How do you know this to be a fact? According to central office administrators, 100% of the district's teachers are aware of the NCTM or NRC standards, because the district distributed copies of these materials to the staff. However, on the basis of their own observations and reports from lead learners, head teachers, and building principals, the administrators estimate that approximately 20% of the teachers actually apply the standards on their own without directions. The Superintendent has directed all Hartford Public Schools central office personnel to provide assistance with, monitor, and report on the implementation of standards-based teaching and learning.

How do administrators and, in particular, principals support and facilitate the adoption of the best instructional models by all teachers? Central office administrators reported that, at present, support is low among high school administrators for facilitating adoption of the best methods for teaching mathematics and science. The typical high school organizational structure and the expectations of staff are designed for a different kind of support mechanism. In other words, the individual high school teachers have specialized

knowledge that crosses a wide territory. One would not expect a high school administrator to have expertise, for instance, in any one of the different fields of science, much less mathematics. Hence, the high school staff depends on the district mathematics and science chairpersons for professional development. Also, high school administrators very rarely attend inservice training sessions with their staff.

At the elementary school things are different. The central office administrators reported that the elementary and middle school build principals are "extremely supportive" of their staff in the various areas of the curriculum. Also, these school administrators manage and deliver support services, including distribution of materials and training sessions. Finally, it is common for elementary and middle school administrators to attend workshops with their staff. Thus, at the high school level, central office administrators communicate through the teachers. At the elementary and middle school levels, they communicate to the teachers through the building principals.

E. Standards-Based Assessment

Which criterion-referenced exams are administered district-wide? How do these tests inform classroom teaching and learning? Which norm-referenced exams are administered district-wide? What are the impacts on student placement? The State of Connecticut requires all districts to administer the CMT and off-level CMT for 4th, 6th, and 8th grade students each fall. The State requires every district to administer the CAPT, which includes science as well as mathematics, to 10th grade students each spring. Public School administrators at state, district, and building levels use these achievement test results to assess the impact of curriculum and instruction on student learning. Thus far, the analysis of data, interpretation of results, and implications for practice and policy development are in an early stage of development. The Hartford Public Schools receive assistance from the Connecticut Academy for Education on the improvement of techniques for data identification, collection, management, and use. It is too early to determine the impact of data-based management on student learning. However, the Superintendent's goals for 1997-98 indicate that the district is moving in that direction.

Are CPMSA students administered any additional exams? If so, why? Yes. Advanced Placement tests are available to the high school students on a voluntary basis. The purpose is to offer Hartford students the challenge to excel and demonstrate higher level knowledge in mathematics and science. The AP testing also provides awareness and opportunities for post-secondary education.

How are CPMSA periodic and annual assessments used to inform district teachers, counselors, and administrators about their roles in district progress toward CPMSA goals? The linkage between student assessments and CPMSA goals is in the process of being established by the Superintendent and other central office administrators in association with the Connecticut Academy for Education and other interested partners, such as UTC and colleges in the greater Hartford area. District chairpersons have responsibility to develop the means to evaluate the performance of staff in reference to the results from annual CMT and CAPT assessments.

How does the district respond to periodic and annual assessments that indicate improvement is needed? There is no doubt that the annual CMT and CAPT assessment results for Hartford's students are the lowest in Connecticut. Everyone who works in the Hartford Public School System and many individuals and organizations who are partners or observers of this scene feel a great sense of anguish and frustration over the recurrent low scores. Nonetheless, these teachers, administrators, and partners always take the bad news with a firm commitment to continue their mission to improve education in Hartford. And they sincerely hope the day is near when significant progress will be evident in these test results. In this regard, the educational scene in Hartford, Connecticut is not substantively different from that of Washington, DC; Miami; or Los Angeles. Meanwhile, in Hartford the educators and partners are designing and implementing data management tools and strategies for information processing that is linked to high quality program development.

How are students informed of the student achievement goals and objectives of the program? Documentation from interviews with different participants indicates that students and parents have not received this information.

How many students are achieving success in science and mathematics courses? It is too early to assess the impact of the CPMSA program on students' performance in mathematics and science. Also, see TISC tables for baseline data and discussion of data collection efforts.

How many students are showing greater interest in pursuing mathematics, science, and other technology-

based careers? CRE has prepared special survey instruments to collect this information from students, parents, and teachers. However, at this time, the district has not distributed the surveys.

How many students are seeking and gaining admission to post-secondary education? We are not able to answer this question at this time.

F. Professional Development

What percentage of teachers on elementary, middle, and secondary school levels have received in-service training? The district's central office administrators reported that 100% of the teachers at all levels are required to take at least 18 Continuing Education Units (CEU) of professional development each school year. Data from central office records indicates that most teachers exceed that requirement.

Are professional development activities ongoing, developmental, content-based, and constructively oriented? The answer to all four items is yes. Central office administrators said that the teachers' professional development program, especially in mathematics and science, is planned, ongoing, and systematically related to standards-based teaching, learning, and assessment. The Superintendent's goals for 1997-98 specifically targets the improvement of the district's professional development program through the design and implementation of a three-year comprehensive plan for all employees, beginning October 15, 1997.

What percentage of teachers on each level has received more than three weeks of professional development? Central office administrators said they are aware of no teachers who accumulate three weeks of professional development activities. (See TISC tables.) These administrators estimate that three weeks of professional development would amount to approximately 90 hours of inservice, which would be 2-3 hours per week for the school year. Most teachers fall within the 20 - 80 hour range for inservice time annually.

How do professional development activities take into account the diversity of student learning styles, while simultaneously adhering to standards-based outcomes? Central office administrators, building principals, and classroom teachers reported that the characteristics of Hartford students require the district to focus on learning styles and the district consistently addresses this issue. Since a majority of the district's students are at least one year behind in reading ability, teachers are regularly encouraged by lead learners, building principals, and district chairpersons to think of different ways to provide instruction. In particular, the supervisors of instruction promote teachers' use of hands-on activities, calculators, and discovery approaches, such as the kit-based science program.

What monitoring mechanisms do you use to determine if teachers have permanently changed their instructional practice? How often are teachers monitored each year, and who monitors teachers? The monitoring mechanisms are under development, as indicated in the Superintendent's goals for 1997-98, and thus have not been implemented. There is one observation that is required each year for all teachers. Subsequent to the report of results for the annual observation, approximately 20% of the district's teachers receive a second observation. The building principal and vice-principals conduct staff evaluations. In addition, all new teachers who are hired by the district must complete the state's BEST program, which includes six observations per year for two years. Successful completion of the BEST program requires teachers to develop a portfolio.

What are teachers' reactions to professional development programs? CRE does not have data from the teachers yet, since the surveys we developed have not been distributed by the district. However, central office administrators reported that the teachers are generally positive about the district's professional development program. In fact, many teachers voluntarily attended Saturday inservice sessions concerned with the teaching of mathematics and science. Negative comments from teachers regarding professional development usually concern the designated time for the events. Also, there has been wavering and uncertainty in the union contract negotiations, which ultimately reduced the required number of hours for teachers' inservice. Also, many teachers questioned the timing and the process for determining which teachers would participate in the 1997 summer enrichment program.

How does the district evaluate whether its investment in professional development results in a significant improvement in the ways that teachers teach and children learn? District officials said that they assess the overall impact of teaching, administration, and professional development on the basis of students' annual results on the CMT and the CAPT. The path to improvement is set in the Superintendent's goals for 1997-98, which are consistent with the "Forty-Eight Recommendations" and standards for curriculum, teaching, assessment, and professional development from the State Department of Education as well as the NCTM and

NRC.

G. Partnerships, Parental Involvement, and Public Awareness

1. Partnerships with Universities, Business, Industry, and Community Groups

Has the district developed a comprehensive strategy for broad-based support of CPMSA among all segments of the community? No. One of the most important findings and most often repeated concern about the Hartford CPMSA is that there has not been a full time CPMSA program director, whose responsibilities would include development and implementation of a plan for partnerships. All of the partners currently involved in the CPMSA have had longstanding, positive relations with the Hartford Public School System. The commitments and financial contributions from the Connecticut Academy for Education and UTC, for instance, have been substantial over the years. However, their representatives and spokespersons, and including others from the State Department of Education and colleges in the greater Hartford area, reported that they have little or no knowledge of CPMSA operations that comes through ordinary channels, such as official collaborative planning meetings, memos, and other documents. They are aware of no plan or strategy to secure broad-based support of the CPMSA from partners.

What financial or in-kind services are provided by community based organizations, business and industry, and university partners involved in CPMSA activities? Include the number of providers and the amounts provided. The annual budget for Hartford Public Schools in 1996 was $200,000,000. The best estimate CRE received for cash contributions from other than local tax based support is $6,600,000. Also, there is $371,000 worth of in-kind services provided to the Hartford Public Schools. Documentation from a recent report of private sector funding to support Hartford school children indicates that there were 23 private-sector funders in 1996. Details from the report of September 22, 1997 are not for public release. An influential CPMSA partner said that Hartford does not have a problem with being "under-resourced," its chief problem is "to get clarity and a focus on all the money that flows into the system from the different corporate and private and public sources. They don't have that right now. The Superintendent knows it now and is in favor of that accountability." One of the Superintendent's goals for 1997-98 is to determine the sources, amounts, and intended uses of all soft money that comes into the Hartford Public School System.

What are the outcomes of the partnerships? We have reported above on the contributions from UTC, the Connecticut Academy, CPEP, and others. The Loctite Corporation provided grants to schools to improve libraries collections in mathematics, science, and technology, and to support science learning. St. Joseph College also provided inservice on teaching math and science, especially in regard to the science kits. The University of Hartford assisted with technology education. Also, TMSC provided technology training. There is evidence that the contributions of these partners have led to significant improvements in various areas of concern to CPMSA, including building level use of technology and professional development for teaching mathematics and science. However, most partners reported that the contracts or cooperative agreements from the school district came very late in the first year of CPMSA. Also, most of the outcomes are presented as anecdotal information. For instance, the 1997 summer enrichment program was "fantastic for the students and teachers." The kit-based science program is "a terrific way to teach science." Since the CPMSA did not employ an external evaluator until late September 1997, there has been no systematic effort by a friendly critic to document and assess the outcomes of partnerships or the CPMSA program itself. The partners said that these issues are due to a lack of consistent and focused management that would be provided by a full time program director.

What does each partner gain? In a word, leverage. Partners reported that they are very pleased that the CPMSA program is in place in Hartford, because the goals of CPMSA and the terms and conditions for its implementation provide assurance that their funds and in-kind contributions, which are intended to support the improvement of children's education in mathematics, science, and technology, will be used appropriately. Thus, NSF's emphasis on accountability provides greater assurance that private-sector support will find its way into the classrooms and buildings where it can do the most good. Also, implementing CPMSA successfully requires focused and consistent leadership at all levels. A partner said, "We are pleased that Hartford's new Superintendent has embraced this CPMSA initiative, and the Board of Trustees has, also. This unification is important for us as a partner and for building coordination of programs and leadership in Hartford's schools."

What do students gain from the partnerships? Clearly, the students at South Middle School gain the

opportunity to study in a school where technology hardware and software are available and where their teachers have the professional skills to use instructional technology to enhance the teaching and learning of mathematics and science. Documentation from building principals and teachers in each of the four schools indicates that there are positive results for the students. They said that the focused attention on technology infrastructure and professional development in their schools, thanks to the contributions of different CPMSA partners, has contributed to students' development of positive attitudes about mathematics and, especially, science.

What is the impact of these partnerships on the goals and objectives of the district's CPMSA? The most important contribution that the partnering activity has had on the district's implementation of the CPMSA program is clarifying and emphasizing the issues of leadership, management, and accountability for producing systemic reform of mathematics and science education in the Hartford Public Schools. The unification of the Superintendent and the State-appointed Board of Trustees on the goals for 1997-98 and the "Forty-Eight Recommendations" is a good indication that these partnerships and the CPMSA program have had a positive impact on Hartford.

How are these partnerships managed, coordinated, and communicated, and how do they fit into the overall improvement plan? During the short interval when Mr. David Lawrence served part time as CPMSA Program Director, the initiative gained substantially in regard to management issues. However, prior to his appointment, and especially afterwards, the CPMSA program was "without focus and splintered," according to Hartford partners and educators.

2. Parental Involvement

How does the district provide opportunities for parents to partner with the school in the education of the child? Every school has a parent liaison person, who is funded by Title I, whose job is to contact the parents. Also, every school building has a school governance team or site-based management team, which is 50% parents. Also, the building principal and teachers organize parent nights, during which parents meet with their teachers and building administrators to find out about their children's academic progress.

How are the existence of parent involvement programs communicated to parents? There is written communication prepared by the teachers and building principals which is transferred to the parents by the children at the end of the school day. These documents are written in English and Spanish. The parent liaison and classroom teachers are required to make phone calls to the parents before Parent Teacher Organization meetings and Open House.

How well attended are parent involvement programs? Central office administrators, building principals and teachers reported that attendance of parents at school events decreases from K-12. When the children are very young, the parents are more likely to attend a school event in the PK-5 buildings. However, once the children reach middle school, the parents are less involved in their children's education. The officials reported that some schools have more parent involvement and others less. The variation is due to different issues, some of which are school-related. However, building principals reported a heavy turnout of parents for the final event of the 1997 summer enrichment program.

How are parents informed about mathematics and science education requirements and CPMSA program-related information? School officials acknowledged that "not much went home this year." The fact that there was no full time CPMSA program director and secretary accounts for the poor communication with parents and other community members, including partners. Indeed, many participants in the interviews reported that it was next to impossible to call into the district's central office and speak with someone who could talk about the program from an informed position. Very often callers left messages requesting assistance or answers to questions, but their calls were never returned. "You can't reach anybody there," was a common complaint from participants. Parents who attempt to call into the district's headquarters must be frustrated, also. Parent involvement is one of the Superintendent's main issues for the 1997-98 school year.

3. Public Awareness

How has participation in CPMSA changed the way community organizations view the school district? During the first year, the limited efforts to disseminate information about CPMSA to parents and community organizations leaves them with little or no information about the program.

How has participation in CPMSA changed the way universities view the school district? Data from interviews with university personnel indicates that there has been little or no change in their view of the Hartford Public School System as a result of the CPMSA. However, these same people are very much

concerned to see the district follow through on its commitments to the CPMSA, particularly in regard to making the best use of university partnerships to foster systemic change in mathematics and science education.

How has participation in CPMSA changed the way business and industry view the school district? One of the representatives from business said, "we are a results-first partner, therefore, we are waiting to see data that shows the CPMSA program is accomplishing its objectives in a timely fashion. CPMSA is a plus for Hartford. Many people are going to be looking at the CMT and CAPT scores to see if they improve over time." Thus, the answer to this question is both yes and no. Yes, there has been a change because business and industry are also unified with the Superintendent and the Board of Trustees. No, it has not changed their view of the district at all, because they are not content with paperwork and good intentions. They want to see results that show there has been a positive impact on teaching and learning of mathematics and science in Hartford's K-12 public schools.

4. Other Factors

A. School District Climate

How has the implementation of CPMSA changed the norms, values, ideals, and flow of communication throughout the district and within the organizational subsets, such as central office and schools? Because the CPMSA program has been in place for less than one year and there were several substantive issues regarding leadership and management in the district as well as within the CPMSA program, there has been little change at the school building or district levels. However, Dr. Cimochowski has put the Curriculum Support Teams model in place and Dr. Daniel's goals for the 1997-98 school year set the stage for substantive work to begin on systemic education reform in Hartford.

B. Attitudes of Teachers and Other School Staff

How has the implementation of CPMSA improved the way teachers, counselors, principals and other school staff feel about their jobs? CRE has addressed these concerns in the surveys it prepared for distribution to students, parents, and teachers. However, the district has not distributed the surveys.

C. Student Attitudes

How has the implementation of CPMSA changed the way students feel about their teachers and their school? Once again, CRE has addressed these concerns in the surveys it prepared for distribution to students, parents, and teachers. However, the district has not distributed the surveys.

D. Parent Attitudes

What do parents of participating students feel about the goal of CPMSA, their chances to help support these goals, and their involvement in their child's education? To repeat, CRE has addressed these concerns in the surveys it prepared for distribution to students, parents, and teachers. However, the district has not distributed the surveys.

E. Student Enrichment Activities

By what process does the CPMSA ensure that student enrichment activities will result in enrollment and successful completion rate increases in higher level math and science courses? The development of a data-based management system is under way. There was no ongoing evaluation of the first-year program or activities, thus, it is not possible to access data that might indicate the directions which might be taken.

What percentage of CPMSA program students are directly involved in enrichment activities? All of the students at the four target schools received the invitation to participate in the 1997 summer enrichment program. Building principals, participating teachers, and central office administrators reported that enrollment was high, but attendance dropped off sharply for the three-week event. Since there was no formal evaluation, it is not possible to report more accurately on the attendance.

What are student reactions to the enrichment programs? Everyone who was involved with the 1997 summer enrichment program pronounced it "a great success." Among other things, Dr. Allen Haught's secondary level science curriculum succeeded in capturing the students' interest in the physics of boomerangs, rockets, and catapults. Teachers at the elementary schools said their students are still talking about the science of their summer school experience.

5. Summary

The first year of the Hartford CPMSA program has had mixed results. The good news is that the Hartford Public School System has a State-appointed Board of Trustees and a new Superintendent who are unified in

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vision, purpose, and goals. Dr. Patricia Daniel has embraced the "Forty-Eight Recommendations." Also, the Superintendent and her associates at the central office headquarters have established new policies for graduation, a new model for developing and implementing curriculum, and strong commitments to standards-based teaching, learning, assessment, and professional development. Concerning the professional development of teachers, the district's curriculum chairpersons have responsibility in 1997-98 for designing and implementing a system to monitor and report on the progress made by individual teachers toward standards-based classroom practice. These and other recent accomplishments are fully consistent with the mission of CPMSA, NCTM and NRC standards, and the standards-based curriculum frameworks and assessments of the Connecticut State Department of Education.

The less palatable news is that the first year of Hartford's CPMSA suffered because there was no one in a leadership position whose full time responsibility was to manage the CPMSA's operations and budget to ensure that all activities would occur in a timely, effective manner. From the standpoint of the key partners, including the Connecticut Academy for Education (SSI), the Connecticut State Department of Education, the Loctite Corporation, the United Technologies Corporation, and the National Science Foundation this shortcoming is significant. These partners have invested substantial sums of money and energy to improve mathematics and science education in Hartford's schools. They waited and hoped that something would happen. Would the district appoint someone to lead the CPMSA program? Would an external evaluation document its impact and, thus, renew their confidence that the Hartford Public School System was turning the corner on systemic reform? At first, nothing happened. Key people in the system, including Joseph Wall, Pamela Barker-Jones, and Dr. Anna Cimochowski, stepped up to make things happen in Saturday workshops with teacher trainers and the 1997 summer enrichment program. These activities were the first ever for the district. There was technology planning, which led to three technology learning centers that address critical professional development needs. Then, a qualified person was hired, but only part-time. Next, he resigned because the job demanded a full time commitment. The partners had said CPMSA needed a full time director from the start. On this issue of CPMSA's leadership, the outsiders and insiders were in full agreement. Teachers, building principals, and central office administrators also said that the lack of focused and consistent leadership has been the most serious problem of Hartford's CPMSA. "The ideas are golden, the delivery was not" said a building principal.

CRE concurs. However, we strongly encourage NSF to renew its faith in the Hartford CPMSA. The future of CPMSA within the Hartford Public School District depends upon the effect of both strategic and tactical operations. The *strategic operation*, involving general principles agreed to by the Board of Trustees and the Superintendent of Schools, seem to be well started. What remains to be done are the implementation of the *tactical aspects*, including the day-by-day features of educational processes in the schools that are needed to bring about the desired improvements. The first step in tactical implementation is clearly the appointment of a full time program director with no distracting responsibilities and with direct access to the superintendent.

During the 1996-97 school year, this old urban school system passed through a leadership crisis of major proportions. The result was a state takeover of its public schools, a State-appointed Board of Trustees, and a new superintendent of schools. The worst seems to be over now, and the stage is set for demonstrating real progress. A well-managed CPMSA program is not only possible in Hartford, but also crucial to systemic reform of mathematics, science, and technology education for Hartford's children. There are many stakeholders who believe that Hartford will not mess up this chance to create a shining example of urban education.

6. Attachments

A. Methodology

In September 1997, officials of the Hartford Public Schools retained Curriculum Research & Evaluation (CRE) to serve as external evaluator for the Hartford CPMSA. Methods of data collection consisted of interviews with all of the key players, including current and former Hartford Public School central office personnel who had responsibility for designing and implementing the CPMSA grant; building principals of the four target schools at elementary, middle, and high school levels; lead teachers for mathematics and science; and classroom teachers. Also, CRE interviewed the CPMSA's principal partners in the greater Hartford area. Included were representatives from business and industry; colleges and universities; parents; inservice consultants and providers, such as the Project to Increase Mastery of Mathematics and Science (PIMMS), Project CONNSTRUCT, the Statewide Systemic Initiative; and the Connecticut State Department of

Education.

In some instances, particularly with Hartford Public School's central office personnel, the interview questions followed more or less strictly the list of questions supplied by the National Science Foundation (NSF). In other instances, the principal evaluator used the following questions: What are the most important accomplishments of Hartford's CPMSA in its planning year, 1996-1997? What, if any, are the substantive issues or problems associated with the first-year implementation of the Hartford CPMSA? Please describe your involvement, if any, in the Hartford CPMSA? If you or your organization has not been involved as a participant or partner in the Hartford CPMSA, should you have been invited to provide assistance during this planning year? If so, please provide a brief explanation of the contribution your or your organization could have made. What specific recommendations can you offer for development and improvement of the Hartford CPMSA in the immediate future?

Another important source for data to assess the Hartford CPMSA was the collection of documents produced by central office personnel, committees, and lead teachers. CRE reviewed reports, curriculum guides, and other relevant documents with a particular interest in policy changes which promote systemic change for improvement in the teaching and learning of mathematics and science. CRE relied upon the work of Dr. John A. Hubert for his statistical analysis of students' demographic and enrollment data.

In addition, CRE designed survey instruments for students, teachers, and parents on the basis of the goals and objectives of the CPMSA program. The purpose of the surveys was to obtain quantitative and qualitative data regarding participants' perceptions of the extent to which the Hartford CPMSA had succeeded in establishing a school climate for accomplishing its systemic change goals. Thus, the survey data would provide CRE with a more objective base for triangulation of data.

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B. TISC Tables